AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended): A wireless communication device comprising:

a constellation selector that adaptively selects a signal constellation from a set of constellations based on channel state information for a wireless communication channel, wherein the constellation selector maps information bits of an outbound data stream to symbols drawn from the selected constellation to produce a single stream of symbols;

a multi-dimensional beamformer that generates a plurality of differently coded data streams from the single stream of symbols and that adjusts a power allocation to each of the differently coded data streams, wherein the multi-dimensional beamformer forms blocks of symbols from the single stream of symbols and then encodes each of the blocks differently to generate the differently coded data streams; and

a plurality of transmit antennas that output a plurality of waveforms in accordance with the plurality of differently coded data streams.

Claim 2 (Original): The wireless communication device of claim 1, wherein the constellation selector selects the signal constellation based at least in part on partial information for the wireless communication channel.

Claim 3 (Currently Amended): The wireless communication device of claim 1, wherein the constellation selector selects the signal constellation based at least in part on channel mean feedback received from a second wireless communication device when producing the single stream of symbols that is then used by the multi-dimensional beamformer to generate the differently coded data streams.

Claim 4 (Original): The wireless communication device of claim 1, wherein the constellation selector selects the signal constellation based at least in part on a target throughput.

Claim 5 (Currently Amended): The wireless communication device of claim 1, wherein the beamformer comprises a space-time block coder that processes the stream of symbols from the constellation selector by forming the blocks of symbols from the single stream of symbols and then space-time coding each of the blocks differently to generate the plurality of differently coded data streams as a plurality of space-time block coded data streams.

Claim 6 (Currently Amended): The wireless communication device of claim 5, wherein the space-time block coder processes the stream of symbols to generate the plurality of differently coded data streams as N space-time block coded data streams, where N equals the number of transmit antennas.

Claim 7 (Currently Amended): The wireless communication device of claim 5, wherein the beamformer comprises a power splitter that adjusts the power allocation to each of the differently coded data streams to control[[s]] a total power allocated across the space-time block coded data streams.

Claim 8 (Currently Amended): The wireless communication device of claim 7, wherein the power splitter adjusts the power ~~allocated~~ allocation to the space-time block coded streams based at least in part on the channel information.

Claim 9 (Original): The wireless communication device of claim 7, wherein the power splitter adaptively adjusts allocation of total power across the space-time coded data streams as a function of the constellation that is selected by the constellation selector.

Claim 10 (Currently Amended): The wireless communication device of claim ~~1~~ 7, wherein the power splitter adjusts [[a]] the power allocation of the data streams to maximize the transmission rate while maintaining a target bit error rate.

Claim 11 (Previously Presented): The wireless communication device of claim 7, wherein the beamformer applies an antenna weighting vector to the space-time coded data streams to allocate a portion of each of the space-time coded data streams to each of the output antennas.

Claim 12 (Original): The wireless communication device of claim 11, wherein the beamformer adaptively adjusts the antenna weighting vector based on the channel state information.

Claim 13 (Original): The wireless communication device of claim 12, wherein the antenna weighting vector comprises an eigen vector of a correlation matrix representative of the channel state information.

Claim 14 (Original): The wireless communication device of claim 1, wherein the beamformer is a two-dimensional beamformer that generates the plurality of coded data streams as two orthogonal data streams.

Claim 15 (Original): The wireless communication device of claim 1, wherein the wireless communication device comprises a mobile phone.

Claim 16 (Original): The wireless communication device of claim 1, wherein the wireless communication device comprises a base station.

Claim 17 (Currently Amended): A wireless communication device comprising:

a plurality of adaptive modulators to process respective streams of information bits, wherein each adaptive modulator comprises:

(i) a constellation selector that adaptively selects a signal constellation from a set of constellations based on channel state information for a wireless communication channel, wherein the constellation selector maps the respective information bits to symbols drawn from the selected constellation to produce a single stream of symbols; and

(ii) a multi-dimensional beamformer that generates a plurality of differently coded data streams from the single stream of symbols and adjusts a power allocation to each of the differently coded data streams, wherein the multi-dimensional beamformer forms blocks of symbols from the single stream of symbols and then encodes each of the blocks differently to generate the differently coded data streams; and

a modulator to produce a multi-carrier output waveform in accordance with the plurality of differently coded data streams from each multi-dimensional beamformer for transmission through the wireless communication channel.

Claim 18 (Original): The wireless communication device of claim 17, further comprising a plurality of transmit antennas that output the multi-carrier waveform.

Claim 19 (Currently Amended): The wireless communication device of claim 17, wherein each adaptive modulator further comprises:

a power loader that processes the respective stream of information bits and loads additional information bits indicative of [[a]] the power ~~allocated~~ allocation to the respective stream of information bits,

wherein the respective constellation selector adaptively selects the signal constellation based on ~~based on~~ the additional information bits.

Claim 20 (Original): The wireless communication device of claim 19, wherein the power loader of the adaptive modulators loads the additional information bits based on the channel state information.

Claim 21 (Original): The wireless communication device of claim 17, wherein the constellation selectors of the adaptive modulators load additional information bits within the streams of information bits to indicate the selected constellations.

Claim 22 (Original): The wireless communication device of claim 21, wherein the constellation selectors of the adaptive modulators insert the additional bits by determining which of the streams of information bits are able to support each of the additional bits with the least required additional power.

Claim 23 (Original): The wireless communication device of claim 17, wherein the adaptive modulators jointly perform power and bit loading across the streams of information bits.

Claim 24 (Original): The wireless communication device of claim 17, wherein the constellation selectors of the adaptive modulators select the signal constellation for the respective stream of information bits based on partial information for the wireless communication channel.

Claim 25 (Currently Amended): The wireless communication device of claim 17, wherein the beamformer of each of the adaptive modulators comprises a space-time block coder that processes the respective stream of symbols from the constellation selector by forming the blocks of symbols from the single stream of symbols and then space-time coding each of the blocks differently to generate the differently coded data streams as a plurality of space-time block coded data streams.

Claim 26 (Original): The wireless communication device of claim 25, wherein the beamformer of each of the adaptive modulators comprises a power splitter that controls a total power allocated across the space-time block coded data streams based on the channel information.

Claim 27 (Previously Presented): The wireless communication device of claim 25, wherein the beamformer of each of the adaptive modulators applies an antenna weighting vector to the space-time coded data streams based on the channel state information to allocate a portion of each of the space-time coded data streams to each of the output antennas.

Claim 28 (Original): The wireless communication device of claim 17, wherein the wireless communication device comprises a mobile phone.

Claim 29 (Currently Amended): The wireless communication device of claim 17, wherein the wireless communication device comprises a base station.

Claim 30 (Currently Amended): A method comprising:

receiving channel state information for a wireless communication system;

adaptively selecting a signal constellation from a set of constellations based on the channel state information;

mapping information bits of an outbound data stream to symbols drawn from the selected constellation to produce a single stream of symbols;

applying a multi-dimensional beamformer to the single stream of symbols to generate a plurality of differently coded data streams and to adjust a power allocation to each of the differently coded data streams wherein the multi-dimensional beamformer forms blocks of symbols from the single stream of symbols and then encodes each of the blocks differently to generate the differently coded data streams; and

outputting a plurality of waveforms from a plurality of transmit antennas in accordance with the plurality of differently coded data streams.

Claim 31 (Cancelled)

Claim 32 (Previously Presented): The method of claim 30, wherein adaptively selecting a signal constellation comprises adaptively selecting the signal constellation based at least in part on channel mean feedback received from a second wireless communication device.

Claim 33 (Currently Amended): The method of claim 30, wherein ~~coding signals~~ applying the beamformer to the stream of symbols comprises forming Eigen-beams based on the channel state information.

Claim 34 (Currently Amended): The method of claim ~~31~~ 30, further comprising processing the stream of symbols to generate space-time block coded data streams.

Claim 35 (Currently Amended): The method of claim 34, further comprising applying a power splitter within the beamformer to control a total power allocated across the space-time block coded data streams.

Claim 36 (Currently Amended): The method of claim 35, further comprising adjusting the power ~~allocated~~ allocation to the space-time block coded streams based at least in part on the channel information.

Claim 37 (Previously Presented): The method of claim 35, further comprising adaptively adjusting allocation of total power across the space-time coded data streams as a function of the selected constellation.

Claim 38 (Original): The method of claim 35, further comprising applying an antenna weighting vector to the space-time coded data streams to allocate a portion of each of the space-time coded data streams to each of the multiple antennas.

Claim 39 (Original): The method of claim 38, further comprising adjusting the antenna weighting vector based on the channel state information.

Claim 40 (Previously Presented): The method of claim 30, further comprising:

adaptively selecting a signal constellation from a set of constellations for each sub-carrier of a multi-carrier wireless communication system;

generating an outbound streams for each sub-carrier based on the selected constellations;

applying an eigen-beamformer to each of the streams of symbols to generate a plurality of coded data streams; and

applying modulators to each of the coded data streams to produce a multi-carrier output waveforms for transmission through the multi-carrier wireless communication channel.

Claim 41 (Previously Presented): The method of claim 35, further comprising adaptively selecting a signal constellation for each subcarrier based on the power allocated to each subcarrier.

Claim 42 (Currently Amended): A computer-readable medium encoded with computer executable instructions for causing a programmable processor of a wireless communication device to:

receive channel state information for a wireless communication system;

select a signal constellation from a set of constellations based on the channel state information;

map information bits of an outbound data stream to symbols drawn from the selected constellation to produce a single stream of symbols; and

apply ~~an~~ a multi-dimensional eigen-beamformer to generate a plurality of differently coded data streams from the single stream of symbols, to adjust a power allocation to each of the differently coded data streams, and to produce a plurality of coded signals for transmission over a wireless communication channel, wherein the multi-dimensional beamformer forms blocks of symbols from the single stream of symbols and then encodes each of the blocks differently to generate the differently coded data streams.

Claim 43 (New): The wireless communication device of claim 1, wherein the multi-dimensional beamformer comprises a two-dimensional beamformer that produces two different Alamouti coded data streams that are power loaded and transmitted along two orthogonal basis beams.

Claim 44 (New): The wireless communication device of claim 1, wherein the multi-dimensional beamformer adjusts the power allocation to each of the differently coded data streams based at least in part on channel mean feedback received from a second wireless communication device.